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## [12] 实用新型专利说明书

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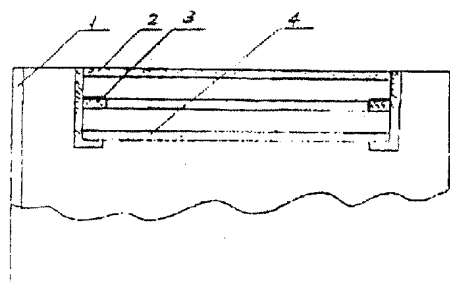
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[54]实用新型名称 非接触 RF 卡与条形码复合双鉴读写器

[57]摘要

非接触 RF 卡与条形码复合双鉴读写器是地铁票务自动管理系统中的一种控制装置,在用条形码纸质零票和 RF 卡通票的情况下,将 RF 卡天线制成环形天线,置于条形码激光读写器窗口中双层玻璃之间,结构成为一体,合用一单片机处理 RF 卡和条形码的数据,实现非接触地、无方向性的识别条形码和 RF 卡。为地铁乘客和地铁票务管理提供了方便。



## 权利要求书

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- 1、一种非接触 RF 卡与条形码复合双鉴读写器，它由机壳<1>、电源<31>、复位键（RFSET）<32>、单片机<33>、条形码接口电路<34>、液晶或发光二极管状态显示器<35>、蜂鸣器<36>、功率输出器<37>、编码器<38>、调制器<39>、解调器<40>、解码器<41>和高频信号发生器<42>组成，其特征是 RF 卡天线<3>为环形天线，置于条形码激光窗口的耐磨玻璃<2>和滤光玻璃<4>之间的间隙内，结构上成为一体。
- 2、按权利要求 1 所述的非接触 RF 卡与条形码复合双鉴读写器，其特征是 RF 卡天线<3>用双面敷铜板制成，成为两圈互相绝缘固定为一体的结构。

# 说明书

## 非接触 RF 卡与条形码复合双鉴读写器

本实用新型涉及一种地铁自动控制装置。

在发达国家里，地铁的票务管理已实现了自动化。地铁票已不再是我国现行的低质的零票和通票，而是采用技术上更为先进的磁卡或 IC 卡制作零票的通票。使用磁卡或 IC 卡的地铁票，在检票时，人人都要将票卡插入读写器一次。在我国客流量特别大的情况下，插卡次数就特别多，磨损就非常严重，因而导致读写器的寿命大大缩短。为了实现非接触地传递电子信息，延长读写器的寿命，专家提出采用低质条形码票作为零票、RF 卡作为通票的复合票制。条形码是一种可印刷的自动识别的机器语言，由于其显而易见的可复制性，长期以来，它一直是代表某种特定信息的符号，而不代表一定的价值，利用计算机技术可使条形码应用于含有价值的票证之中，同时保证票证的安全性，不被伪造，从而使地铁即售即用的票务系统自动化成为现实。

RF 卡是 IC 卡进一步发展的产物，是大规模集成电路技术和无线电技术发展结合的产品。RF 卡的特点是：存储容量大，其容量从 1K 字节到 8K 字节；无接触操作，使用时无需准确的插拔操作；一卡多用，具有 16 种独立应用的功能，可开发除客票应用之外的其它应用。因此，RF 卡与条形码复合票制成为地铁票制改进的首选。但是，条形码的阅读是全角度激光扫描识别，RF 卡是无线电信息读写，各自的识别机理和设备是分别独立的，在地铁这种单一通道的条件下，分设两套设备、分别在不同的设备上检票，显然是极不方便也不实用的。

本实用新型的设计目的是将 RF 卡的读写和条形码的识别在同一装置上同一窗口上进行，实现非接触、无方向性地识别和处理两种不同媒体上的信息。

本实用新型的设计目的是以如下技术方案实现的：将 RF 卡的天线设计成环形天线，置于条形码激光窗口的耐磨玻璃和滤光玻璃之间的间隙内，结构上成为一体；RF 卡天线用双面敷铜板制成，成为两圈互相绝缘又固定为一体的结构；用同一单片机及其电路和软件处理 RF 卡和条形码两种不同媒体的信息，制成双鉴读写器。

本实用新型设计方案可以实现在同一窗口上非接触地、无方向性地识别条形码和读写 RF 卡的能力，使用方便，达到了设计目的。

以下将结合附图对本实用新型作进一步详细的描述：

图 1 是本实用新型结构示意图；

图 2a、b 是本实用新型 RF 卡天线示意图；

图 3 是本实用新型电路原理方块图。

参照图 1，本实用新型 RF 卡天线 3 安装在条形码阅读窗口中耐磨玻璃 2 和滤光玻璃 4 之间，并共同安装于同一机壳 1 内。

参照图 2，本实用新型 RF 卡天线 3 是由双面敷铜板用腐蚀方法制成，成为两圈互相绝缘又固定为一体的结构，敷铜板的玻璃布 21 的正反面的敷铜条构成

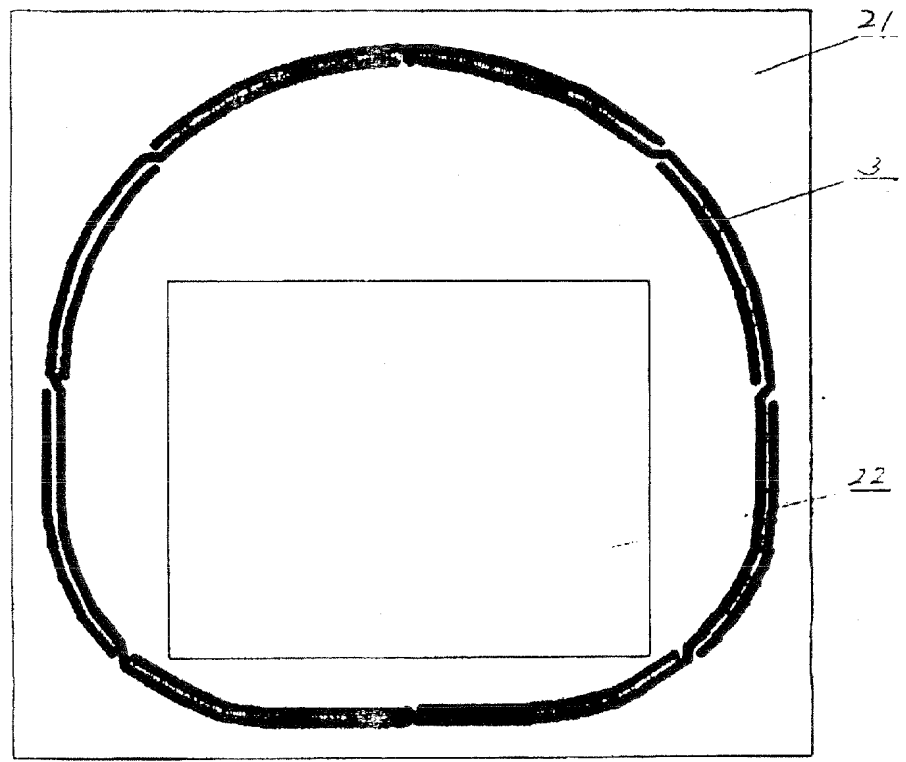


图 2a

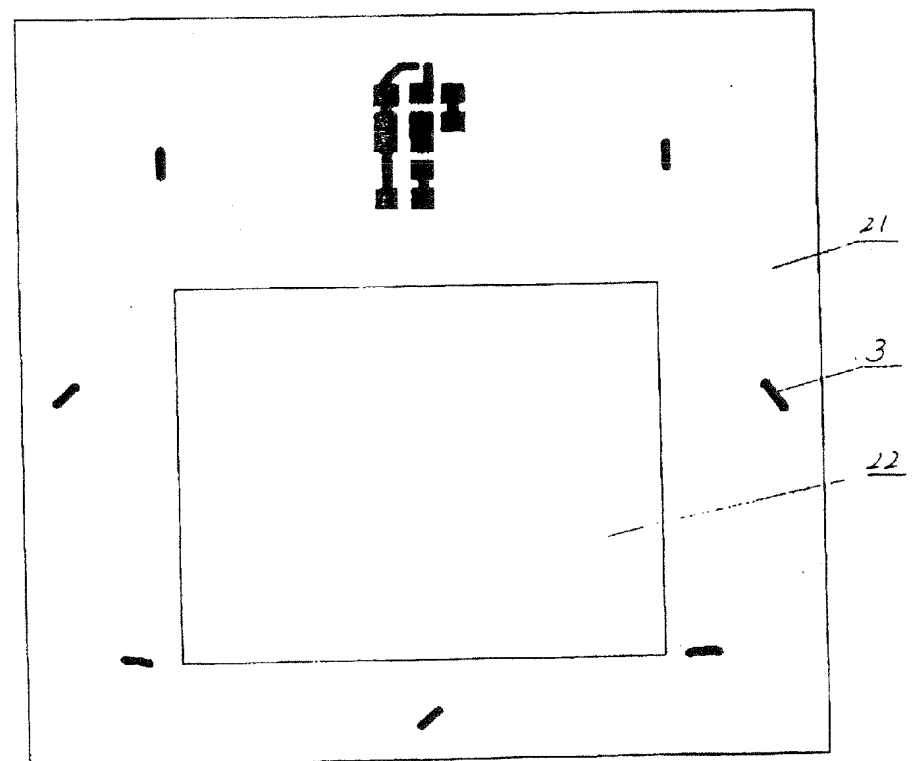


图 2b

RF卡天线3，窗口22的尺寸保证不遮挡连读、多条、无方向性脉冲激光束，以利于条形码信息的识别。

参照图3，本实用新型由电源31、复位键（RFSET）32、单片机33，条形码接口电路34、液晶或发光二极管状态显示器35、蜂鸣器36、功率输出器37、编码器38、调制器39、解调器40、解码器41和高频载波信号发生器42组成；调制器39与天线RF卡3是电容耦合，解调器40与RF卡天线3是电感耦合；条形码接口电路34直接接受条形码识别信号，功率输出器37将控制信号发送给自动门，以达到检测与控制的目的。

本实用新型电子器件均为集成电路、以单片机33为控制核心，协调电路运作。单片机33给出数据，经编码器38、调制器39送到RF卡天线3，接收到RF卡发回的数据，经解调器40、解码器41后送入单片机33进行处理。高频信号发生42给调制器39以高频载波信号，使调制器39给RF卡天线3发送信号成为可能。条形码票由激光阅读器读入后，由条形码接口电路34送入单片机33进行处理。读写后通过显示器35显示多种实时状态，通过蜂鸣器36给出声响警示，通过功率输出器37进行连续处理和自动门。

本实用新型经过试制试验证明设计合理、适于实用，是地铁票务自动管理系统当中必备的设备。

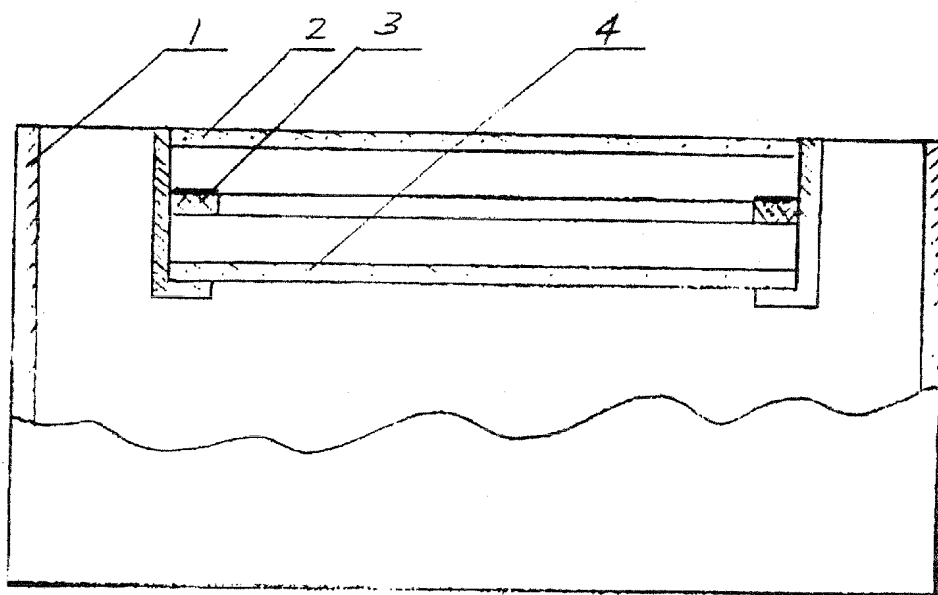


图 1

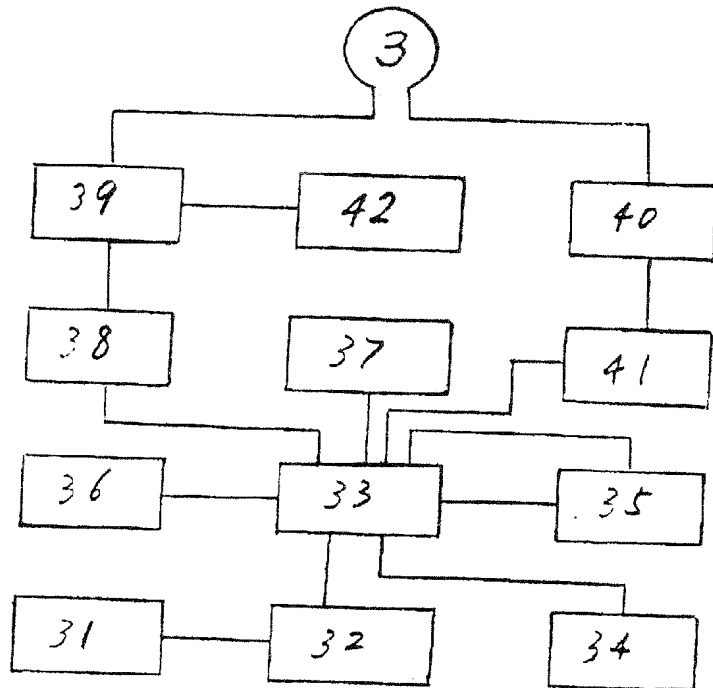


图 3

CPEL0550911P

Reference 2

[Title]

Non-contact RF card and bar code combination double authentication  
read/write device

[Abstract]

The non-contact RF card and bar code combination double authentication read/write device is a controller in a subway ticketing automatic management system. In the case of using bar code paper single tickets and RF card passes, the RF card antenna is made into a ring-shaped antenna and placed between double layers of glass in a window of a bar code laser read/write device. They are formed into a single object, and use jointly a single-plate device to process the data of the RF cards and the bar codes, realizing non-contact and non-directional identification of bar codes and RF cards. It provides convenience for subway passengers and Subway ticketing management.

[Claims]

1. a non-contact RF card and bar code combination double authentication read/write device formed by a casing (1)、 power supply (31)、 reset key (32)、 single-plate device (33)、 bar code interfacing circuit (34)、 liquid crystal or light-emitting diode state display (35)、 buzzer (36)、 power outputting means (37)、 encoder (38)、 modulator (39)、 demodulator (40)、 decoder (41) and high-frequency signal generator (42); characterized in that:

RF card antenna (3) is a ring-shaped antenna placed within a gap between

wear-resistant glass (2) and light-filtering glass (4) of a bar code laser window and integrated into a single body structurally.

2. The non-contact RF card and bar code combination double authentication read/write device as described in claim 1, characterized in that the RF card antenna (3) is fabricated with a two-surface copper-coated plate, forming into a structure of two circles mutually insulated and secured as a single body.

[Description]

Non-contact RF card and bar code combination double authentication read/write device.

This utility model relates to a subway automatic controlling means.

In developed countries, automatic subway ticketing management has been implemented. Subway tickets are no longer the current low quality single tickets and passes of our country, but passes of single tickets fabricated by the technically more advanced magnetic cards or IC cards are adopted. For subway tickets that use magnetic cards or IC cards, for checking the tickets, every passenger has to insert a ticket card into a read/write device once. In the case of especially large passenger volume in our country, the number of card insertions is especially large, and wearing is very serious, thereby resulting in a greatly shortened life of a read/write device. Experts have proposed a combination ticket system using low-quality bar code tickets as single tickets, and RF cards as passes. Bar code is a printable machine language that is automatically identified. Because of its obvious reproducibility, it for a long time is a symbol that represents certain specific information, but does not represent a certain value. Using computer techniques, bar codes can be applied in tickets that contain values, which at the same time ensures the security of



the tickets, not be counterfeited, thereby making the automation of sell-and-use subway ticketing systems a reality.

RF card is a further developed product of IC card, and is a product combining the developments of large-scale integrated circuit technique and wireless technique. The characteristics of RF cards are: large memory volume from 1k byte to 8k bytes; non-contact operation, requiring no accurate insertion operation while in use; and one card for multiple use, having 16 independent functions, and applications other than ticket applications may be developed. Therefore, RF card and bar code combination ticket system becomes the first choice for subway ticket system improvement. However, the reading of bar codes is all-angle laser scanning identification, while RF card is wireless information reading and writing. Their identification mechanisms and equipment are respectively independent. Under the condition of a single pass gate of subway, to separately providing two sets of equipment and to check the tickets on different equipment is obviously inconvenient and not practical.

The object of the design of this utility model is to perform the reading and writing of a RF card and the identification of bar code in the same window on the same device, to realize in a non-contact and non-directional manner identifying and processing information on two different media.

The object of the design of this utility model is realized by the following technical solution: the antenna of the RF card is designed into a ring-shaped antenna placed within a gap between wear-resistant glass and light-filtering glass of a bar code laser window and integrated into a single body structurally; the RF card antenna is fabricated with a two-surface copper-coated plate, forming into a structure of two circles mutually insulated and secured as a single body; the same single-plate device and its circuit and software are used to process the information of

two different media of RF cards and bar codes, forming a double authentication read/write device.

The design solution of this utility model can realize the capability of identifying bar codes and reading/writing RF cards on the same window in a non-contact and non-directional manner, is convenient to use, and fulfills the design object.

Further description in detail is made below for this utility mode with reference to the figures.

Fig. 1 is a schematic diagram for this utility mode.

Fig. 2a、 b are schematic diagrams for the RF card antenna of this utility model.

Fig. 3 is a block diagram for the principle of the circuit of this utility model.

With reference to Fig. 1, RF card antenna 3 of this utility model is mounted between wear-resistant glass 2 and light-filtering glass 4 in a bar code read/write window, and they are jointly mounted in the same casing 1.

With reference to Fig. 2, RF card antenna 3 of this utility model is fabricated from a double-surface copper-coated plate by an anetching method, forming a structure of two circles insulated from one another and secured into a single body. The copper coating filaments on the front and back surfaces of a copper-coated plate of glass sheet 21 form the RF card antenna 3. The size of window 22 ensures not blocking continuous、 multiple and non-directional pules laser beams, to be beneficial for the identification of bar-code information.

With reference to Fig. 3, this utility model is formed by power supply 31、 reset key (RESET) 32、 single-plate device 33、 bar code interfacing

circuit 34、 liquid crystal or light-emitting diode state display 35、 buzzer 36、 power outputting means 37、 encoder 38、 modulator 39、 demodulator 40、 decoder 41 and high-frequency signal generator 42; modulator 39 and antenna RF card 3 are capacitor-coupled, and demodulator 40 and RF card antenna 3 are inductance-coupled; bar code interfacing circuit 34 directly receives bar code identification signals, and power outputting means 37 sends a control signal to an automatic gate, to achieve the object of detection and control.

This utility model electronic device is an integrated circuit, with single-plate device 33 as the control core, coordinating the circuit operation. Single-plate device 33 sends out data, which are sent via encoder 38、 modulator 39 to RF card antenna 3, and receives the data sent back from the RF card via demodulator 40, decoder 41, and then sent to the single-plate device 33 for processing. High-frequency signal generator 42 provides high-frequency carrier signal to modulator 39, making modulator 39 sending a signal to RF card antenna 3 possible. After a bar code ticket is read in by a laser reader, data are sent by bar code interfacing circuit 34 to single-plate device 33 for processing. After reading and writing, a plurality of real-time states are displayed by displayer 35, sound alert is provided by buzzer 36, and continuous processing and control of automatic gate are performed by power outputting means 37.

This utility mode is proved to be of reasonable design by fabrication and experiment, is suitable for application, and is an indispensable device in automatic management systems for subway ticketing.

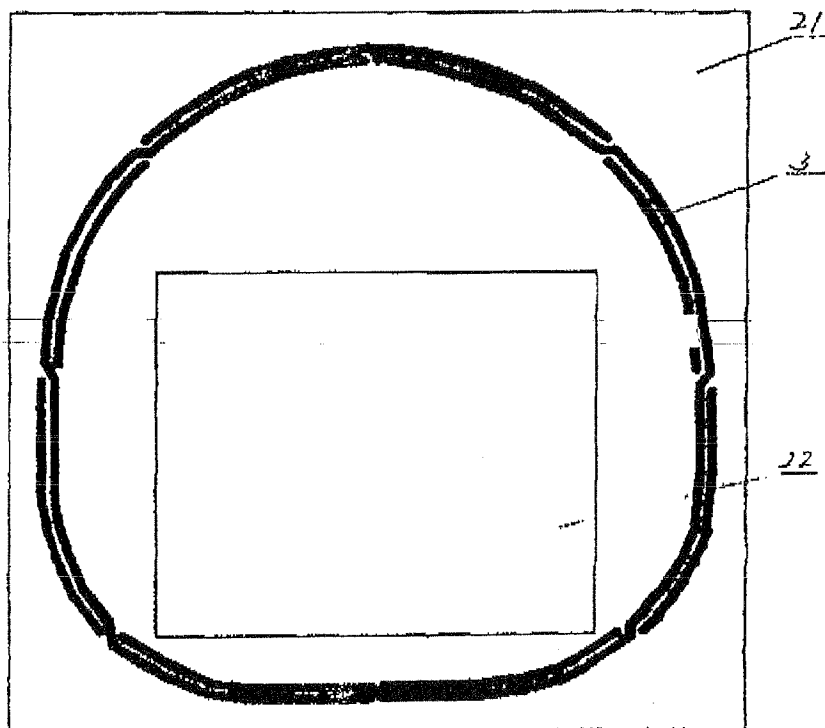


Fig. 2a

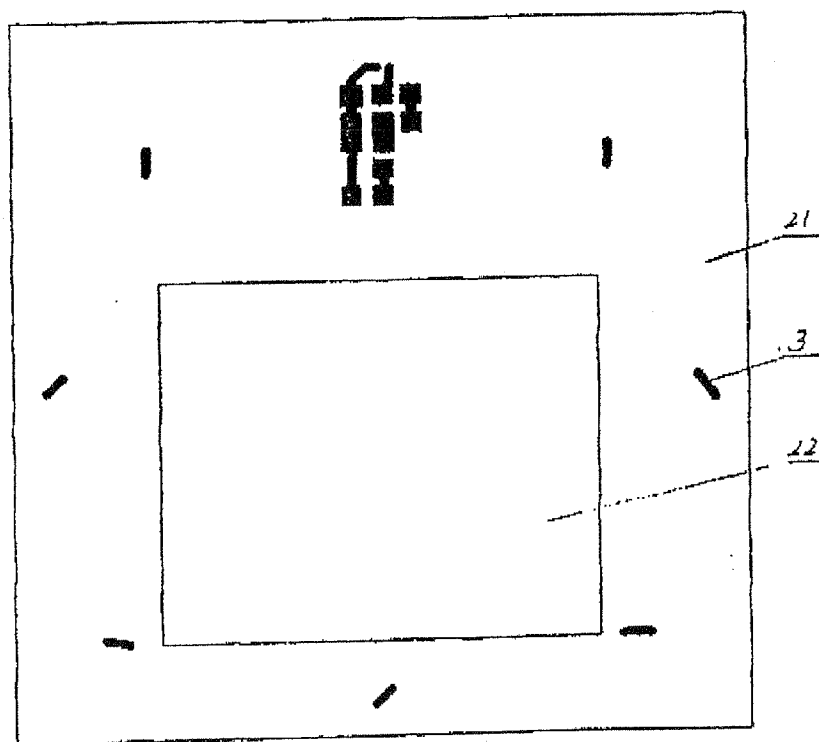


Fig. 2b

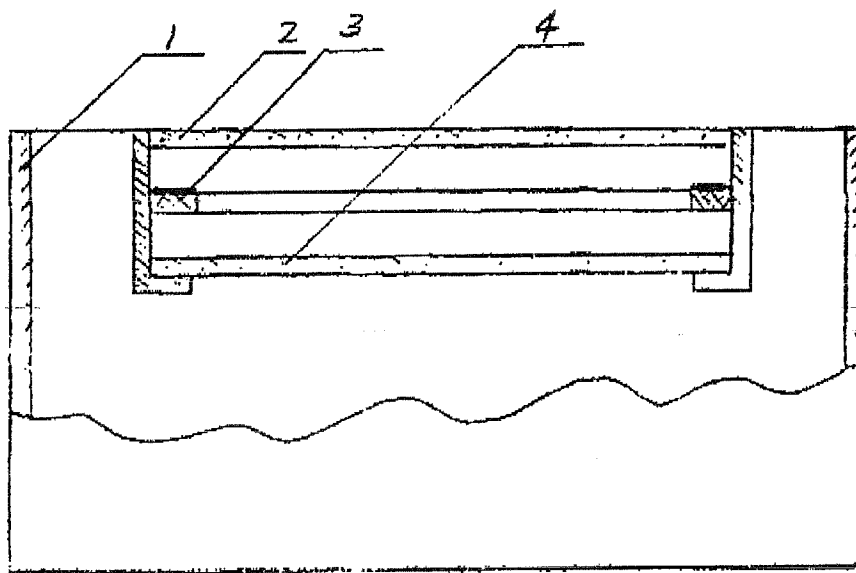


Fig. 1

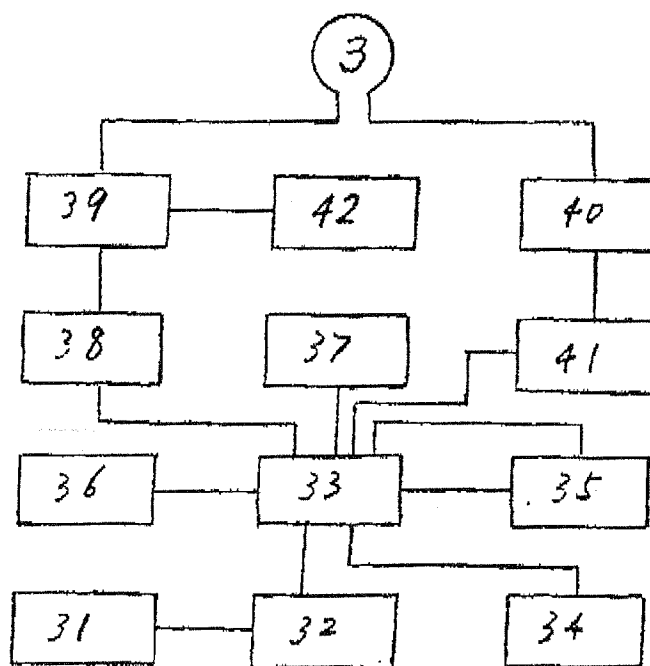


Fig. 3